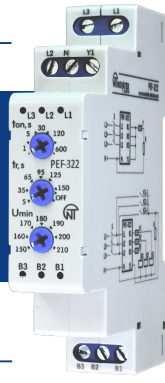


UNIVERSAL AUTOMATIC ELECTRONIC PHASE SWITCH PEF-322

OPERATING MANUAL



The quality management system of development and production complies with the requirements of ISO 9001:2015

Dear Customer,

NOVATEK-ELECTRO Ltd. Company thanks you for purchasing our products. You will be able to use properly the device after carefully studying the Operating Manual. Store the Operating Manual throughout the service life of the device.

DEVICE SERVICE

Universal automatic electronic phase switch PEF-322 (hereinafter referred to as PEF-322, device) is designed for supplying industrial and household single-phase load 230 V 50 Hz from three-phase four-wire network (3x400+N) in order to provide power supply of especially critical single-phase consumers and protect them from inadmissible voltage fluctuations in the network.

PEF-322 is typically connected to a three-phase supply network and provides switching of single-phase consumers to the supply phase optimal in terms of voltage level, in case of fluctuations or complete failure of the supply voltage of the "operating" phase. PEF-322 provides constant control of the presence and quality of voltage on the phases and, depending on the parameters, automatically selects the most optimal phase and switches the power supply of single-phase load to this phase. When switching from phase to phase, in order to avoid inter-phase short-circuits, the PEF-322 checks the disconnection of the emergency phase and only then switches on the reserve phase. In case of relay or contactor contacts sticking, the PEF-322 does not switch to another phase, even if the voltage in this phase exceeds the set limits (protection against phase-to-phase short-circuit). The PEF-322 has a function of external contactors status monitoring (winding breakage, contact burnout, etc.).

PEF-322 can be operated with 2 or 3 independent sources of single-phase voltage, frequency from 45 Hz to 65 Hz. It can be used in a single-phase network, with an electric generator as an additional phase. It is used in networks with unstable voltage for security and fire alarm supply systems, CCTV, authorized access, industrial and technological and other single-phase equipment with a continuous cycle of operation. PEF-322 has a function of return to the priority phase after switching to the standby phase (return of power supply to the load from the priority phase after voltage restoration). The device is powered from the circuit that supplies the load.

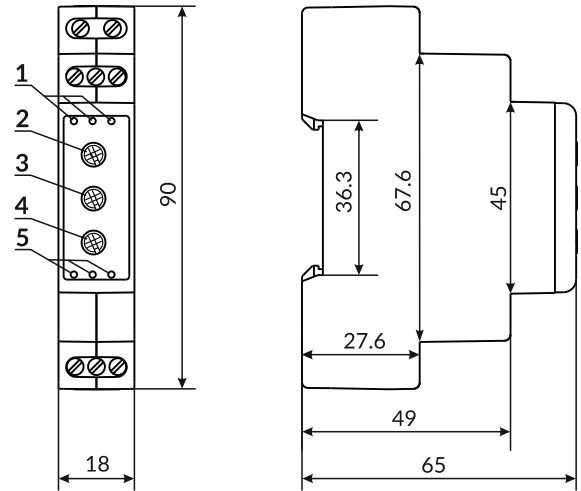
Load power:

- at power up to 1.8 kW (8 A), the load is supplied directly from the PEF-322;
- at power exceeding 1.8 kW (8 A), the device controls coils of magnetic starters of corresponding power (MS are not included in the set).

The following table shows the characteristics of the PEF-322 output contacts.

Maximum switching current at active load	8 A
Maximum switching power at active load (cos φ = 1.0)	1.8 kW
Maximum switching power with active-inductive load (cos φ = 0.4)	0.4 kW
Maximum permissible AC voltage	275 V
Service life:	
- mechanical	≥ 500 000 times
- electrical	≥ 20 000 times

Controls and overall dimensions of PEF-322



- 1 - L1, L2, L3 - input voltage indicators per phase;
- 2 - ton - reclosure time setting knob;
- 3 - tr - knob for return time to the priority phase setting;
- 4 - Umin - minimum voltage threshold setting knob;
- 5 - B1, B2, B3 - output phase indicators.

PEF-322 has three independent inputs, terminals "L1" (priority phase) and "L2", "L3" (reserve phases) and output terminals "B1", "B2", "B3" respectively for load connection. Terminal "N" for connecting the neutral wire, feedback terminal "Y1" is for control the correctness of contacts of internal relays of the PEF-322 or MS.

Figure 1

TERMS AND ABBREVIATIONS

AR - automatic reclosure delay that counts down after the device is powered up or after the relay is switched off due to emergency voltage on all input phases of the PEF-322;

MS - magnetic starter.

ACCEPTANCE CERTIFICATE

PEF-322 has been manufactured and accepted in accordance with the requirements of valid technical documentation and classified as fit for operation.

Head of QCD

Date of manufacture

Seal

TECHNICAL SPECIFICATIONS

Nominal AC single-phase supply voltage	230 – 240 V
Mains frequency	45 – 65 Hz
Adjustable minimum voltage switching (tripping) threshold (U _{min})	150 – 210 V
Switching (tripping) time at voltage below threshold U _{min}	6 s
Switching (tripping) time at voltages below 140V	0.15 s
Voltage hysteresis	4 V
Rated impulse withstand voltage	2.5 kV
Voltage measurement accuracy in the range 120 – 350 V	not less than 2%
Maximum voltage switching (tripping) threshold	265 V
Switching (tripping) time for voltages over 265 V	0.3 s
Priority phase return time	5 – 150 s
Ability to disable phase priority	available
No-current pause time when switching to backup phases	≤ 0.05 s
AR time by voltage	1 – 600 s
Ready for operation time	≤ 0.8 s
Power consumption with unconnected load	≤ 2 W
Maximum voltage at which operation is preserved (effective value)	400 V
Minimum voltage at which operation is preserved (effective value)	100 V
Nominal insulation voltage	450 V
Voltage threshold detection accuracy	3 V
Nominal operating mode	Continuous
Climatic version	NF 3.1
Protection degree of the device	IP 10
Category of overload	II
Pollution rate	II
Electric shock protection class	II
Cross-section of connection terminal wires	0.5 – 2.0 mm ²
Screw torque of terminal clams	0.4 N*m
Weight	≤ 0.2 kg
Overall dimensions, HxBxL	90x18x65 mm
The device meets the requirements of: EN 60947-1; EN 60947-6-2; EN 55011; EN 61000-4-2	
Mounting – on standard DIN-rail 35 mm	
The device remains operational capability in any position in space	
Housing material – self-extinguishing plastic	
Harmful substances in concentration more than allowed are absent	

OPERATION CONDITIONS

The device is designed for operation in the following conditions:

- ambient temperature: from minus 35 to +45°C;
- atmospheric pressure: from 84 to 106.7 kPa;
- relative air humidity (at temperature of +25°C): 30...80 %.

If the temperature of the device after transportation or storage differs from the environment temperature at which it is expected to operate, then before connection to electric mains keep the device under the operating conditions within two hours (because the device elements may have moisture condensation).

ATTENTION! The device is not intended for operation in the following conditions:

- significant vibration and shocks;
- high humidity;
- aggressive environment with content in the air of acids, alkalis, etc., as well as severe contaminations (grease, oil, dust, etc.).

THE DEVICE CONNECTION



DEVICE TERMINALS AND INTERNAL COMPONENTS ARE UNDER POTENTIALLY LETHAL VOLTAGE.

All connections must be performed when the device is de-energized.

-2-

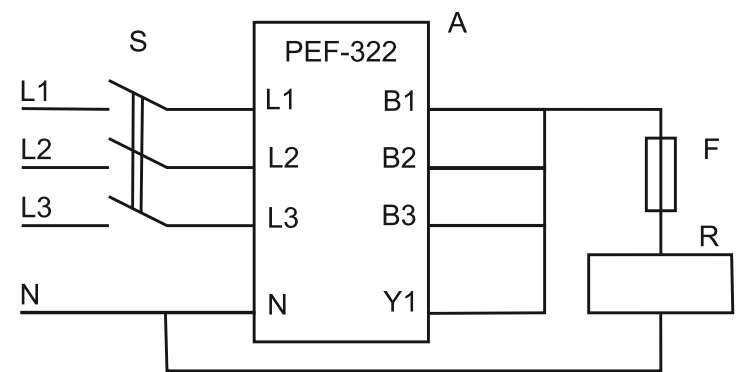
It is not allowed to leave exposed portions of wire protruding beyond the terminal block.

Error when performing the installation works may damage the device and connected devices.

To ensure the reliability of electrical connections you should use flexible (stranded) wires with insulation for voltage of no less than 450 V. The cross-section of the wire for connecting the protected equipment depends on the current (power) of the load, and should be: for current of 8 A (1.8 kVA) – no less than 1 mm². The ends of which it is necessary to be striped of insulation for 5±0.5 mm and tightened with bootlaces. Wires fastening should exclude mechanical damage, twisting and abrasion of the wire insulation.

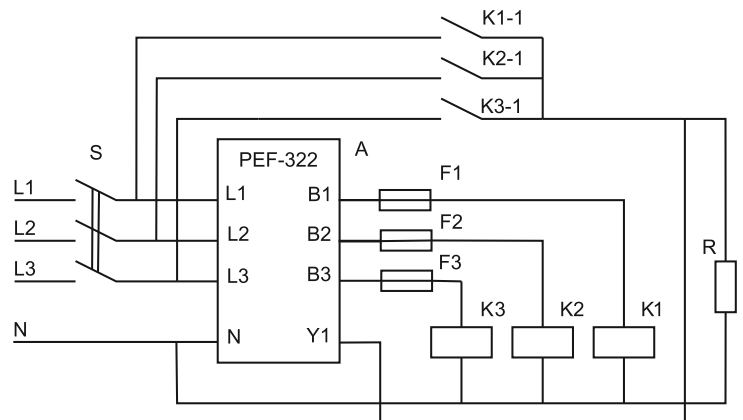
For a reliable contact, tighten the terminal screws with the force indicated 0.4 N*m. When reducing the tightening torque, the junction point is heated, the terminal block may be melted and wire can burn. If you increase the tightening torque, it is possible to have thread failure of the terminal block screws or the compression of the connected wire.

1. Connect the device according to Fig. 2 for direct connection and according to Fig. 3 for MS connection.



A – PEF-322;
F – fuse (circuit breaker) 10 A;
R – load no more than 3a 1.8 kW;
S – switch.

Figure 2



A – PEF-322;
F1 - F3 – fuse (circuit breaker) 10 A;
K1 - K3 – magnetic starter;
R – load;
S – switch.

Figure 3

2. Use the knobs on the front panel to set the required values of reclosure time (ton), return time to the priority phase (tr) and minimum voltage threshold (U_{min}).

3. Supply power to the device.

OPERATION OF THE DEVICE

When supply power is supplied, PEF-322 counts down the reclosure time and then checks the voltage on the priority phase and, if all parameters are within the permissible values, connects the load.

If the voltage value of the priority phase does not correspond to the set parameters, PEF-322 checks the reserve phase and connects the load through it. When the supply voltage on the priority phase is restored, the PEF-322 switches the load to it after a user-defined return time.

PEF-322 controls correctness of internal relays of the device or MS. If there is voltage on terminal "Y1" when the internal relays are switched off, PEF-322 is blocked. PEF-322 operation can be continued only after the power supply is completely removed.

If at switched on internal relay of the device "B1", "B2" or "B3" there is a loss of feedback signal on input "Y1", PEF-322 considers that the internal relay or MS (when operating with MS) of the present channel is faulty and switches to another channel. In this case PEF-322 memorizes the emergency channel and does not switch to it anymore. Exit from this state is possible only after complete removal of power supply.

If all three phases are damaged, the load will be switched on after the reclosing time has elapsed after the voltage on any phase(s) has been restored.

Attention! If the device has been operated in violation of the requirements of this Manual, the user will lose the right to warranty service.

Warranty service is performed at the place of purchase or by the manufacturer of the device.

Post-warranty service of the device is performed by the manufacturer at current rates.

Before sending for repair, the device should be packed in the original or other packing excluding mechanical damage.

CLAIMS DATA

You are kindly requested, in case of the device return and transfer it to the warranty (post-warranty) service please indicate detailed reason for the return in the field of the claims data.

SAFETY PRECAUTIONS

Attention! Under maintenance, disconnect the device and units connected to it from the mains.

Do not make any attempt to open and repair the device yourself.

Do not use the device with mechanical damage to the case.

Do not allow water to enter the internal parts of the device, the receptacle and the plug.

During operation and maintenance, meet the requirements of the «Rules for the technical operation of electricitygenerating equipment of consumers», «The safety regulations for operation of electricitygenerating equipment of consumers» and «Labor protection during operation of electricitygenerating equipment».

MAINTENANCE

The maintenance rate recommended is every six months.

Maintenance procedure:

- 1) Check the connection reliability of the wires, if necessary, clamp with the force specified;
- 2) Visually check the integrity of the housing, in case of detection of cracks and damages take the device out of service and send for repair;
- 3) If necessary, wipe the front panel and the housing of the device with cloth.

Do not use abrasives or solvents for cleaning.

TRANSPORTATION AND STORAGE

The device in the original package is permitted to be transported and stored at the temperature from minus 45 to +60 °C and relative humidity of no more than 80 %.

SERVICE LIFE AND WARRANTY

The lifetime of the device is 10 years. Upon expiration of the service life, contact the manufacturer.

Shelf life is 3 years.

Warranty period of the device operation is 5 years from the date of sale.

During the warranty period of operation (in the case of failure of the device) the manufacturer is responsible for free repair of the device.

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The Company is grateful to you for the information about the quality of the device and suggestions for its operation.



For all questions, please contact the manufacturer:

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Date of sale _____